



PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE HONORABLE BOARD OF PATENT APPEALS AND  
INTERFERENCES

In re the Application of:

Docket No.: ACH 2947 US

Paul O'Connor, et al.

Examiner: Christina Ann Johnson

Application No.: 10/603,274

Law Office: 1725

Filed: June 25, 2003

For: FCC CATALYST FOR REDUCING THE SULFUR CONTENT IN  
GASOLINE AND DIESEL

Mail Stop Appeal Brief – Patents  
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P.O. Box 1450  
Alexandria, VA 22313-1450

BRIEF ON APPEAL

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CERTIFICATE OF MAILING

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I. INTRODUCTION

This is an appeal from a final Office Action for the above-identified patent application, mailed January 6, 2005 rejecting claims 1-9 and objecting to claims 10-14, which are all of the claims in the application.

A. Real Party In Interest

The real party in interest for this appeal and the present application is Akzo Nobel N.V., by way of an Assignment recorded in the U.S. Patent and Trademark Office at Reel 013985, Frame 0994.

B. Statement Of Related Appeals And Interferences

There are presently no appeals or interferences, known to Appellants, Appellants' representative or the Assignee, which will directly affect or be directly affected by or have a bearing upon the Board's decision in the pending appeal.

C. Status Of Claims

Claims 1-15 are pending. Claims 1-9 stand finally rejected and are on appeal. Claims 10-14 were indicated by the Examiner to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 15 was withdrawn pursuant to a restriction requirement.

Claims 1-15 are set forth in the attached Appendix.

D. Status Of Amendments

No amendment was filed after final rejection.

II. THE INVENTION

Appellants have discovered a novel and nonobvious catalyst composition comprising about 5-55 wt% metal-doped anionic clay, about 10-50 wt% zeolite, about 5-40 wt% matrix alumina, about 0-10 wt% silica, about 0-10 wt% of other ingredients, and the balance kaolin. The anionic clay is obtained by a process comprising mixing a trivalent metal source and a divalent metal source, at least one of them being water-insoluble, in aqueous suspension.

The invention also comprises a process for making the above composition wherein zeolite, metal-doped anionic clay, alumina, kaolin, and optionally silica and other ingredients are mixed in aqueous suspension and subsequently shaped to form particles.

III. THE APPLIED REFERENCES

The applied references are EP 0 278 535 ('535"), with regard to a rejection under 35 USC §102, and WO 01/12570 ('570) in view of '535, with regard to a rejection under 35 USC §103.

IV. ISSUE

The issues on appeal are whether claims 1-4 are anticipated by '535 and whether claims 1-9 are obvious over '570 in view of '535.

V. GROUPING OF CLAIMS

There are two groupings of claims. Claims 1-4 are the group that was the subject of the rejection under 35 USC §102, and claims 1-9 are the group that was the subject of the rejection under 35 USC §103.

VI. ARGUMENT

Rejection Under 35 USC § 102

The composition of the present invention comprises a unique combination of components, including about 5-55 wt% metal-doped anionic clay and about 5-40 wt% matrix alumina. The term "metal doped anionic clay" has a special meaning as explained in the second full paragraph on page 7 of the instant text, which is anionic clay prepared by a process wherein the metal additive(s) is/are present during the formation of the anionic clay. This is distinguished from impregnation that is performed after the formation of anionic clay has been completed.

These metal-doped anionic clays are prepared by aging an aqueous suspension of divalent and trivalent metal source, at least one of them being water-insoluble, optionally followed by thermal treatment, i.e. calcination, and rehydration to form anionic clay again. The dopant is introduced during one of these steps (page 7, lines 21-26).

The thermal treatment can be conducted at 150-900°C (page 8, lines 25-28). Anionic clays, e.g. hydrotalcite, begin to decompose at a temperature below 200°C, which decomposition is reversible. Due to this reversibility, the thermally treated anionic clay can be transformed into anionic clay by way of rehydration.

Matrix alumina, as explained in the first paragraph of page 5, means that the alumina is present in the continuous phase.

It is also important in preparing the composition of the present invention that the anionic clay is obtained by a process comprising mixing a trivalent metal source and a divalent metal source, at least one of them being water-insoluble, in aqueous suspension. This results in anionic clay having a physical structure fundamentally different than if the trivalent and divalent metal sources are both water soluble and co-precipitated. The unique structure of the anionic clay used in the composition of the invention will have a positive affect on the performance of the composition of the invention when used to produce gasoline and/or diesel having reduced sulfur content.

The superiority of the catalyst composition of the present invention is amply demonstrated in Example 7 of the instant text, where the use of a Zn-doped anionic clay resulted in a sulfur reduction in an FCC unit gasoline product which was 17% higher than the sulfur reduction resulting from the use of a Zn-impregnated anionic clay.

It is particularly important to note that the anionic clays prepared in accordance with the process of the invention, as illustrated in Examples 3, 4 and 6, are shown by X-ray diffraction pattern to be fundamentally different in structure than anionic clays prepared with a known process, as illustrated in Comparative Examples 1, 2 and 5. The difference resides in the degree of homogeneity of dispersion of the doping phase within the clay. Once again, reference is made to Example 7 that shows the superiority of clay having the unique structure of the present invention with regard to sulfur reduction.

The compositions of '535, such as shown in its example 6, are prepared by calcining anionic clay for 2 hrs. at 600°C, impregnating the calcined material

with rare earth metal salts using standard impregnation conditions and calcining the impregnated material for a second time under the same conditions.

A standard impregnation technique is incipient wetness impregnation as used in WO 99/49001, cited in the instant application in the paragraph bridging pages 1 and 2: see WO 99/49001's Examples 1 and 2. Incipient wetness impregnation involves filling the pores of a solid with an amount of solution equal to the pore volume, followed by drying. Hence, incipient wetness impregnation of calcined anionic clay involves contacting of the calcined clay with a calculated, small amount of liquid for only a short time, during which the pores become filled. This is not a rehydration and will not result in the formation of anionic clay again.

'535 mentions on page 4, lines 26 and 27 that rare earth metals may be taken up into the sulfur oxides binding material by coprecipitation of compounds of these metals during the preparation of the anionic clay, but gives no hint to the requirement of the instant claims that the anionic clay is obtained by a process comprising mixing a trivalent metal source and a divalent metal source, at least one of them being water-insoluble, in aqueous suspension.

'535 therefore does not disclose a composition comprising a metal-doped anionic clay as employed by the present invention and is most definitely not an anticipation of the present invention.

#### Rejections Under 35 USC § 103

Instant claims 1-9 were rejected under 35 U.S.C. 103(a) as being unpatentable over WO 01/12570 ('570) in view of '535.

'570 uses shaped bodies containing at least 50 wt% of anionic clay with good binding properties (p. 11, lines 21-29). In these bodies, the anionic clay is

the continuous phase, while any other optionally present material, e.g. alumina, is the discontinuous phase (p. 11, line 30, through p. 12, line 5).

However, the composition of '535, like that of the present application, requires the presence of an alumina matrix, which, as discussed above, means that the alumina is the continuous phase, while the metal-doped anionic clay is the discontinuous phase, which situation is opposite to that of '570.

The law is clear that the prior art must show not only all of the elements of the claimed combination, but must contain some "teaching, suggestion or incentive" to a person of ordinary skill to combine the known elements in the way that the Examiner combined them (United States surgical Corp v. Ethicon Inc., 41USPQ 2d 1225, CAFC 1997). The question, therefore, is what teaching, suggestion or incentive is there for one of ordinary skill in the art to combine '570 and '535, while arbitrarily rejecting teachings in those references, such as the use of anionic clay obtained by mixing solutions of trivalent and divalent metal sources in '535, and the use of alumina in the discontinuous phase in '570 to arrive at the present invention? The simple answer to that question is that there is no such teaching, suggestion or incentive.

'570, like the present invention, is concerned with the problem of the production of gasoline and diesel with low sulfur content. The compositions of '535, however, are used for the binding of sulfur oxides (p.1, lines 1-2), which are formed during the regeneration step of an FCC process (p. 1, lines 9-11). In this regeneration step, coke depositions are burnt from the catalyst and without any precautions the sulfur compounds present in the coke deposits are emitted as sulfur oxides. In '535 these sulfur oxides are adsorbed by the anionic clay-containing composition disclosed therein.

'535 does not disclose the production of gasoline or diesel low in sulfur or nitrogen. Although it says in the paragraph bridging pages 6 and 7 that the



catalyst is suitable for cracking sulfur-containing hydrocarbon feeds, it does not mention that the use of this catalyst results in the production of compounds with a low sulfur content. Therefore, the purposes or problems to be addressed in '535 differ from those of '570, which is concerned with the problem of the production of gasoline and diesel with low sulfur content, and these differences preclude any teaching, suggestion or incentive to combine '570 and '535.

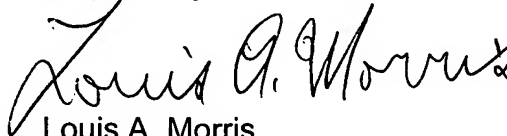
Of course, even if '570 and '535 were somehow combined, the essential requirement of the anionic clay being obtained by a process comprising mixing a trivalent metal source and a divalent metal source, at least one of them being water-insoluble, in aqueous suspension would still be lacking.

Claim 1-4 and 10-14 were also rejected under 35 U.S.C. 103(a) as being unpatentable over Stamires et al. (2002/0159940) in view of '535. However, the subject matter and the claimed invention of Stamires et al. were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person, and thus Stamires et al. does not qualify as prior art (35 U.S.C. 103 (c)). Both Stamires et al. and the instant application were subject to being assigned and have been assigned to Akzo Nobel N.V.

VII. CONCLUSION

For all of the reasons discussed above, it is respectfully submitted that claims 1-9 define patentable subject matter under 35 U.S.C. §102 and 35 U.S.C. §103, and Appellants respectfully request this Honorable Board to reverse the rejection of claims 1-9.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Louis A. Morris". The signature is fluid and cursive, with the first name "Louis" being the most prominent part.

Louis A. Morris

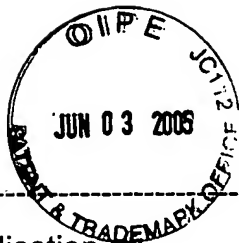
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VIII. APPENDIX

1. A catalyst composition comprising about 5-55 wt% metal-doped anionic clay, about 10-50 wt% zeolite, about 5-40 wt% matrix alumina, about 0-10 wt% silica, about 0-10 wt% of other ingredients, and the balance kaolin, said anionic clay obtained by a process comprising mixing a trivalent metal source and a divalent metal source, at least one of them being water-insoluble, in aqueous suspension.
2. The catalyst composition of claim 1 wherein the anionic clay is doped with at least one compound containing an element selected from the group consisting of Zn, Fe, V, Cu, W, Mo, Co, Nb, Ni, Cr, Ce, and La.
3. The catalyst composition of claim 1 wherein the anionic clay is an Al-Mg-containing anionic clay, an Al-containing non-Mg anionic clay, a Mg-containing non-Al anionic clay, or a non-Mg non-Al anionic clay.
4. A process for the preparation of the catalyst composition of claim 1 wherein zeolite, metal-doped anionic clay, alumina, kaolin, and optionally silica and other ingredients are mixed in aqueous suspension and subsequently shaped to form particles.
5. The process of claim 4 wherein the metal-doped anionic clay is obtained by aging the mixture of trivalent metal source and divalent metal source in the presence of at least one metal dopant.
6. The process of claim 5 wherein the trivalent metal is selected from the group consisting of aluminium, gallium, indium, iron, chromium, vanadium, cobalt, manganese, cerium, niobium, lanthanum, and combinations thereof.

7. The process of claim 5 wherein the divalent metal source and/or the trivalent metal source are selected from the group consisting of oxides, hydroxides, carbonates, hydroxycarbonates, bicarbonates, acetates, and hydroxyacetates.
8. The process of claim 5 wherein the divalent metal is selected from the group consisting of magnesium, zinc, nickel, copper, iron, cobalt, manganese, calcium, barium, and combinations thereof.
9. The process of claim 5, wherein use is made of a metal-doped divalent and/or metal-doped trivalent metal source.
10. The process of claim 4 wherein the metal-doped anionic clay is obtained by aging a trivalent metal source and a divalent metal source, at least one of them being water-insoluble, in aqueous suspension to form an anionic clay, thermally treating the anionic clay to form a solid solution, and rehydrating the solid solution in the presence of at least one metal dopant to form a metal-doped anionic clay.
11. (original) The process of claim 10 wherein the trivalent metal is selected from the group consisting of aluminium, gallium, indium, iron, chromium, vanadium, cobalt, manganese, cerium, niobium, lanthanum, and combinations thereof.
12. (original) The process of claim 10 wherein the divalent metal source and/or the trivalent metal source are selected from the group consisting of oxides, hydroxides, carbonates, hydroxycarbonates, bicarbonates, acetates, and hydroxyacetates.
13. The process of claim 10 wherein the divalent metal is selected from the group consisting of magnesium, zinc, nickel, copper, iron, cobalt, manganese, calcium, barium, and combinations thereof.

14. The process of claim 10, wherein use is made of a metal-doped divalent and/or metal-doped trivalent metal source.
15. A process for the production of gasoline and/or diesel having a reduced sulfur content and/or a reduced nitrogen content comprising contacting a hydrocarbon feedstock with the catalyst composition of claim 1 at fluid catalytic cracking conditions.



TRANSMITTAL LETTER

DFW  
AF#

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PAUL O'CONNOR, et al

Docket: ACH2947US

Serial No.: 10/603,274

Examiner: Christina A.  
Ildebrando

Filing Date: June 25, 2003

Group Art Unit: 1725

Title: FCC CATALYST FOR REDUCING  
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Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

☒ Transmitted herewith is a responsive document(s) for this application.  
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☐ Applicant hereby petitions for an extension of time under 37 CFR 1.136 of:

☐ One Month (\$ 120.00)

☐ Two Months (\$ 450.00)

☐ Three Months (\$1020.00)

☐ Four Months (\$1590.00)

☒ **Appeal Brief**

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Respectfully submitted,

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Vickie Purcell